Disease: Plague*

*** The bacterium that causes plague is a possible bioterrorist agent. See "Special Considerations for Bioterrorism" beginning on page 3.**

Clinical Features: An acute bacterial infection with non-specific initial symptoms including fever, chills, malaise, myalgia, nausea, prostration, sore throat, and headache. Other clinical features depend upon the form of plague; bubonic, pneumonic, septicemic, or pharyngeal plague. Bubonic plague is the most common naturally occurring form and involves inflamed and enlarged lymph nodes (buboes) which may become suppurative. Pneumonic plague may be primary from inspiration of aerosolized organisms or secondary from septicemia. Pharyngeal plague is primary from inspiration of aerosolized organisms. Septicemic plague may develop as the primary presentation or secondarily from all of the other forms.

Organism: *Yersinia pestis*, the plague bacillus. The reservoir is the wild rodent population, especially ground squirrels, and rodent plague exists in the western half of the U.S., including Kansas.

Laboratory Test(s): Blood, CSF, sputum, or aspirate of bubo for bacterial culture. KDHEL does culture testing for *Y. pestis*. Paired sera for fourfold increase in specific antibody is diagnostic. KDHEL does not do serological testing for the organism.

Treatment: Streptomycin is the drug of choice with gentamicin, chloramphenicol and the tetracyclines as acceptable alternatives (see the *CCDM* by Chin).

Incubation Period: 1-7 days for bubonic or septicemic plague. 1-4 days for primary pneumonic plague.

Mode of Transmission: Bubonic plague is transmitted to humans by infected fleas most commonly from infected rodents, lagomorph (rabbits, hares), or domestic pets (dogs or cats). Primary pneumonic may be contracted by exposure to respiratory droplets of another human or a domestic cat with pneumonic plague or plague pharyngitis.

Period of Communicability: Infected fleas may survive for months. Humans with pneumonic plague are infectious until they have been receiving appropriate antibiotic therapy for at least 48 hours..

Susceptibility: Susceptibility is general. Immunity following recovery is limited. Vaccination provides variable immunity from bubonic plague but none from primary pneumonic plague.

Occurrence: Bubonic plague is sporadic among humans in the western U.S. The only documented cases of human primary pneumonic plague (17 total) in the U.S. since 1977 have been contracted from domestic cats.

Outbreak criteria: A single case of primary pneumonic plague should be investigated vigorously until person-to-person, feline-to-human, or other non-intentional mode of transmission has been adequately established. Otherwise, a bioterrorist or other intentional act must be considered.

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Surveillance Case Definition:

Clinical criteria: An acute febrile illness characterized by fever, chills, headache, malaise, prostration, and leukocytosis manifested in one or more of the following forms:

- **S** Regional lymphadenitis (bubonic plague)
- **S** Septicemia without buboes (septicemic plague)
- **S** Pneumonia from hematogenous spread (secondary pneumonic plague) or from inhalation of infectious droplets (primary pneumonic plague)
- **S** Pharyngitis and cervical lymphadenitis (pharyngeal plague)

Laboratory criteria: Cultural isolation of *Y. pestis* or $4-fold rise in antibody to *Y. pestis* F1 antigen is confirmatory. See *Case Definitions for Infectious Conditions* (Appendix X) for presumptive laboratory criteria and case classification information.

Definition of a contact: In non-epidemic conditions, household and face-to-face contacts of individuals with pneumonic plague are considered contacts for purposes of chemoprophylaxis (see the *CCDM* by Chin). In epidemic conditions in which human fleas are known to be involved in transmission, household contacts and intimate friends are considered contacts for disinfestation and chemoprophylaxis.

Case Investigation: Case investigation should focus on identifying household and face-to-face contacts of individuals with pneumonic plague. Environmental investigation should focus on identification of sick or dead rodents and their fleas.

Methods of Control: Prevention is best accomplished by controlling rodent populations in proximity to humans (see *CCDM* by Chin). Vaccination provides variable immunity from bubonic plague but none from primary pneumonic plague.

Isolation: Patients with pneumonic plague should be on strict respiratory isolation until they have been on appropriate antibiotic therapy for at least 48 hours.

Quarantine: Household and face-to-face contacts of patients with pneumonic plague should receive chemoprophylaxis and be under surveillance for 7 days. Such contacts who refuse chemoprophylaxis must be maintained under strict isolation and close surveillance for 7 days.

Follow-up: Cases: For pneumonic plague, follow-up should focus on determining that the patient has completed treatment and is no longer symptomatic.

Contacts: For pneumonic plague, follow-up should focus on determining that the contact has completed chemoprophylaxis as approved by public health authorities, and is asymptomatic 7 days (or more) after last exposure.

Disease: Plague*

Reporting Requirements:

1. Report immediately by telephone to 1-877-427-7317. **See "Special Considerations for Bioterrorism" beginning on the next page.**

2. Complete Kansas Notifiable Disease Form or enter into HAWK.

3. FAX form to: 1-877-427-7318, or

4. Mail form to: Epidemiologic Services Section - KDHE
   Landon State Office Building, Room 1051S
   900 SW Jackson Street
   Topeka, KS 66612-1290

5. An isolate of this organism is not required to be sent to the KDHE Division of Health and Environmental Laboratories.

6. For technical assistance questions, call 1-877-427-7317.

Special Considerations for Bioterrorism:

Identification and Reporting:

Because of the rarity of naturally occurring primary pneumonic plague, even a single case should cause public health authorities to consider the possibility of a bioterrorist or other criminal intentional act. If a natural etiology cannot be readily established by a prompt and vigorous investigation, the situation should be considered to be a bioterrorist act until proven otherwise.

The following contact numbers are staffed 24 hours a day, 365 days a year. Contact in order of priority as shown.

1. Kansas State Epidemiologist: 785-249-8903

2. KDHE Epidemiologist On-Call: 1-877-427-7317

3. CDC Bioterrorism response coordinator hotline: 404-639-0385

Likely Bioterrorist Scenarios:

The plague bacillus could be delivered to intended victims as an aerosol cloud, by means of a small or large spray device or by means of ventilation systems. Bacteria-laden micro-droplets could then be inhaled to cause primary pneumonic plague.

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Safety Considerations for Public Health and Other Health Care Professionals:

By the time the first cases resulting from a bioterrorist act have been identified, there should be no residual risk of exposure at the physical site of the attack. However, all members of the at-risk population (to be defined by public health authorities) with respiratory symptoms should be maintained on strict respiratory isolation, whether hospitalized or not, until determined to be non-infectious. All public health, health care or other response personnel who have been determined to be contacts of cases as the result of their response activity or otherwise, should receive appropriate chemoprophylaxis.

Event Response/Control Measures:

Whether a bioterrorist event is announced or unannounced, local public health officials should play a central role in the event response and in the determination of appropriate control measures.

Definition of the population-at-risk:

> This will be crucial task in such a situation, and will be essential to guide response activities. Public health authorities will play the lead role in this effort, but will consult with law enforcement, emergency response and other professionals in the process. The definition of the population-at-risk may have to be re-evaluated and redefined at various steps in the investigation of, assessment of, and response to a bioterrorist event.
>
> Once a mechanism and scope of delivery have been postulated, symptomatic and asymptomatic potentially exposed individuals can be identified and assessed for treatment or chemoprophylaxis, as well as control measures as described below. The population-at-risk will likely expand as new primary cases are identified and their contacts are subsequently identified.

Control measures which should be addressed are:

Decontamination: Not applicable under usual circumstances.

Post-exposure prophylaxis: Tetracycline (15-30 mg/kg) or chloramphenicol (30 mg/kg) daily in 4 divided doses for 7 days after last possible exposure.

Isolation: Patients with pneumonic plague should be on strict respiratory isolation until they have been on appropriate antibiotic therapy for at least 48 hours.

Quarantine: Household and face-to-face contacts of patients with pneumonic plague should receive chemoprophylaxis and be under surveillance for 7 days. Such contacts who refuse chemoprophylaxis must be maintained under strict isolation and close surveillance for 7 days.

Continued

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Event Response/Control Measures (cont.):

Other public health activities:

Line lists: A central responsibility of the LHD staff is to maintain detailed line lists of cases, suspect cases, and contacts with accurate identifying and locating information as well as appropriate epidemiological information. These lists will be essential for effective enforcement of isolation and quarantine measures, and for early identification of infection among contacts.

Pharmaceuticals:

In the event of an outbreak of plague, adequate quantities of appropriate antibiotics will be procured from the CDC National Pharmaceutical Stockpile Program. Procurement, storage, and distribution will be coordinated through the Kansas Department of Health and Environment.

Use of pharmaceuticals: Local and state public health officials must play a central role in determining which public health workers, health care workers, law-enforcement workers, emergency workers, and other essential personnel should have priority in receipt of limited pharmaceuticals.